a downhole tool connectable to the second end of the drill string;

a pipe handling assembly adapted to extend and reduce the length of the drill string; and

a fluid dispensing assembly adapted to deliver fluid to the downhole tool; and

a machine control system, comprising:

a plurality of sensors, each sensor adapted to detect data relating to at least one parameter characteristic of the operation or environment of the drilling machine; and

a main control circuit adapted to receive data from the plurality of sensors and to automatically operate at least two of the automated functions of the drilling machine in response to this data;

wherein at least one of the plurality of automated functions is selected from the group comprising a pipe handling function, a guidance control function, and a tracking function; and

wherein, when the plurality of automated functions comprises the guidance control function, the plurality of sensors comprises a thrust circuit output sensor adapted to monitor thrust applied to the drill string and transmit a thrust output signal, a rotation circuit output sensor adapted to monitor rotation applied to the drill string and transmit a rotation output signal, and a carriage position sensor adapted to monitor a relative position of a carriage and transmit a carriage position signal, and wherein the main control circuit is further adapted to automatically operate the guidance control function by operating the drive system in response to the thrust output signal, the rotation output signal, and the carriage position

signal until a change of direction is required for the downhole tool; and

wherein, when the plurality of automated functions comprises the tracking function, the plurality of sensors comprises a roll sensor adapted to detect a roll position of the downhole tool and transmit a roll position signal, a pitch sensor adapted to detect a pitch of the downhole tool and transmit a pitch signal, an azimuth sensor adapted to detect an azimuth of the downhole tool and transmit an orientation signal, and a temperature sensor adapted to detect a temperature at the downhole tool and transmit a temperature signal, and wherein the main control circuit is further adapted to automatically operate the tracking function by calculating a position of the downhole tool in response to the roll position signal, the pitch signal, the orientation signal, and the temperature signal.

26-56. Cancelled.

57. (Previously presented) The drilling system of claim 25 wherein the drive system comprises a thrust circuit adapted to thrust the drill string and a rotation circuit adapted to rotate the drill string.

58. (Previously presented) The drilling system of claim 57 wherein the plurality of automated functions includes a power management function; and

wherein the plurality of sensors further comprises an engine speed monitor adapted to detect an operating speed of an engine and transmit an engine output signal, a thrust circuit input sensor adapted to monitor input to the drive system and transmit a thrust input signal, a rotation circuit input sensor adapted to monitor input to the drive system and transmit a rotation

input signal, and a fluid circuit input sensor adapted to monitor input to the fluid dispensing assembly and transmit a fluid input signal; and

wherein the main control circuit is further adapted to automatically operate the power management function by maintaining the engine at an idle speed when the thrust input signal is zero, the rotation input signal is zero, and the fluid input signal is zero.

59. (Previously presented) The drilling system of claim 58 wherein the main control circuit is further adapted to automatically operate the power management function by maintaining the engine at a full speed when the thrust input signal or the rotation input signal or the fluid input signal is not zero.

60. (Previously presented) The drilling system of claim 58 wherein, when the plurality of automated functions comprises the power management function, the plurality of sensors further comprises:

a thrust circuit output sensor adapted to monitor an output of the thrust circuit and transmit a thrust output signal;

a rotation circuit output sensor adapted to monitor an output of the rotation circuit and transmit a rotation output signal; and

a fluid circuit output sensor adapted to monitor an output of the fluid dispensing assembly and transmit a fluid output signal; and

wherein the main control circuit is adapted to regulate output of the engine in response to the engine output signal, the thrust input signal, the rotation input signal, the fluid input signal, the thrust output signal, the rotation output signal, and the fluid output signal to automatically operate the power management function.

61. (Previously presented) The drilling system of claim 60 wherein the main control circuit is further adapted to automatically operate the power management function by

maintaining the engine at an idle speed when the thrust input signal is zero, the rotation input signal is zero, and the fluid input signal is zero.

62. (Previously presented) The drilling system of claim 60 wherein the main control circuit is further adapted to automatically operate the power management function by maintaining the engine at a maximum operating efficiency when the thrust input signal or the rotation input signal or the fluid input signal is not zero.

63. (Previously presented) The drilling system of claim 25 wherein the main control circuit is further adapted to automatically operate the guidance function when the downhole tool is to be advanced in a straight line by operating the drive system to rotate and thrust the drill string until a change of direction is required or the drill string must be lengthened.

64. (Previously presented) The drilling system of claim 25 wherein the main control circuit is further adapted to automatically operate the guidance function when the downhole tool is to be advanced in a particular direction by operating the drive system to rotate the downhole tool to a desired roll orientation and advancing the drill string forward with the downhole tool at the desired roll orientation for a predetermined distance or until the drill string must be lengthened.

65. (Previously presented) The drilling system of claim 57 wherein, when the plurality of automated functions comprises the guidance function, the plurality of sensors further comprises:

a rotation circuit speed sensor adapted to monitor a rotational speed of the drill string and transmit a rotational speed signal; and

a product tension sensor adapted to detect a tension at the downhole tool and transmit a product tension signal; and

wherein the main control circuit is adapted to operate the drive system in response to the thrust output signal, the rotation output signal, the carriage position signal, the rotational speed signal, and the product tension signal to automatically operate the guidance control function.

66. (Previously presented) The drilling system of claim 65 wherein the main control circuit is further adapted to automatically operate the guidance function when the downhole tool is used in a backreaming operation by operating the drive system to rotate and pullback the drill string until the drill string must be shortened.

67. (Currently amended) The drilling system of claim 66 wherein the main control circuit is further adapted to reduce a rate of pullback if the rotation circuit pressure is greater than a predetermined limit.

68. (Previously presented) The drilling system of claim 66 wherein the main control circuit is further adapted to reduce a rate of pullback if the product tension is greater than a predetermined limit.

69. (Currently amended) The drilling system of claim 25 wherein the plurality of functions further comprises a fluid control function; and

wherein the plurality of sensors comprises an operating sensor adapted to transmit an operating signal when the fluid dispensing system is required to be operational, a flow rate sensor adapted to monitor the rate of flow from the fluid dispensing system and transmit a flow rate signal, a fluid pressure sensor adapted to monitor the output of the fluid dispensing system and transmit a fluid pressure signal, and a flow sensor adapted to detect presence of fluid flow and transmit a fluid flow signal; and

wherein the main control circuit is further adapted to automatically operate the fluid control function by operating the fluid dispensing assembly to stop fluid flow when the operating sensor indicates when fluid is not required.

70. (Previously presented) The drilling system of claim 69 wherein the main control circuit is further adapted to automatically operate the fluid control function by operating the fluid dispensing assembly to maintain fluid flow at a predetermined flow rate when the operating sensor indicates fluid is required, a fluid pressure is at a predetermined limit, and a flow rate is above a predetermined rate.

71. Canceled.

72. Canceled.

73. Canceled.

74. Canceled.

75. Canceled.

76. (Currently amended) A method for using a horizontal drilling machine having a plurality of automated functions, the machine comprising a drill string to which an underground tool is attached, the method comprising:

selecting a path along which the underground tool is to be used;

axially advancing the drill string so as to move the underground tool along at least a portion of the selected path until a change of direction is required, while automatically operating at least one of the plurality of automated functions of the drilling machine; and

automatically controlling supply of fluid to the underground tool by stopping fluid flow if the drill string is being lengthened or shortened; and

wherein, when the underground tool is to be advanced in a straight line, the drilling machine is operated by automatically rotating and thrusting the drill string until the[a] change of direction is required or the drill string must be lengthened; and

wherein, when the underground tool is to be advanced in a particular direction, the drilling machine is operated by automatically rotating the underground tool to a desired roll orientation and advancing the drill string forward with the underground tool at the desired roll orientation for a predetermined distance or until the drill string must be lengthened.

77. (Currently amended) The method of claim 76 further comprising automatically controlling supply of fluid to the underground tool by maintaining fluid flow at a

predetermined flow rate when the drill string is being advanced, a fluid pressure is at a predetermined limit, and a measured flow rate exceeds a predetermined limit.

78. (Previously presented) The method of claim 76 further comprising: automatically identifying a position of the underground tool, wherein identifying a position of the underground tool comprises:

sensing a roll position of the underground tool;

sensing a pitch of the underground tool;

sensing an orientation of the underground tool;

sensing a temperature of the underground tool; and

calculating the position of the underground tool using the sensed roll position, pitch, orientation, and temperature information.